

HIGHER: Key Stage 4 Maths Curriculum

Long term plan Year 9

Autumn 1	
Chapter 1: Calculations	Chapter 2: Expressions
Assessment: Chapter Test A	Assessment: Chapter Test A
Builds Upon: <ul style="list-style-type: none">• Order integers, decimals and negative numbers• Round to nearest 10,100, 1000• Round to decimal places• Add/Subtract numbers with decimals• Multiply numbers with decimals• Divide using the algorithm (by hand)• Divide decimal numbers using the algorithm• Order of Operations (BIDMAS)	Builds Upon: <ul style="list-style-type: none">• Apply algebraic notation to write simple expressions• Simplify expressions by collecting like terms (addition and subtraction)• Apply the Index laws (multiplication, division)• Apply the Index laws (fractional, negative and zero)• Expanding single brackets Expand two single brackets and simplify• Factorise single brackets
Introduces: <ul style="list-style-type: none">• Rounding to significant figures• Estimate by rounding to one significant figure• Add/Subtract negative numbers• Multiply/Divide negative numbers• Manipulate of operations involving decimals (using one calculation to find the answer to another)	Introduces: <ul style="list-style-type: none">• Simplifying algebraic fractions Add/Subtract algebraic fractions• Multiplying algebraic fractions• Divide algebraic fractions

Autumn 2

Chapter 3: Angles and Polygons

Assessment: Chapter Test A

Builds Upon:

- Measure and describe angles as acute, right, obtuse or reflex
- Describe and apply the properties of angles around a point (sum of 360 degrees)
- Describe and apply the properties of angles on a straight line (sum of 180 degrees)
- Derive and apply the sum of angles in triangles and quadrilaterals
- Calculate interior angles in polygons (using angles in a triangle)
- Deduce and apply the sum of interior angles of any polygon and use $(n-2)*180$

Introduces:

- Calculate bearings based on angles around a point
- Describe and apply the equivalence of vertically opposite angles
- Identify and apply the properties of angles in parallel lines (alternate, corresponding and co-interior rules)
- Apply knowledge of special triangles to derive angles
- Solve problems involving all of the above (providing reasons)
- Identify similarity between shapes
- Calculate and apply scale factors
- Identify and describe types of congruence (SSS, SAS, ASA, RHS)
- Apply similarity and congruence to problem solve
- Calculate and apply scale factors for area and volume from the linear scale factor
- Calculate exterior angles in polygons
- Solve problems involving angles in polygons

Spring 1	
Chapter 4: Handling Data 1	Chapter 5: Fractions Decimals and Percentages
Assessment: Chapter Test A	Assessment: Chapter Test A
Builds Upon: <ul style="list-style-type: none"> • Construct and interpreting bar charts • Construct and interpret two way tables • Calculate the mean, mode and median of listed data • 	Builds Upon: <ul style="list-style-type: none"> • Name and construct fraction diagrams • Convert between improper fractions and mixed numbers • Identify and create equivalent fractions • Simplifying fractions • Write fractions as decimals • Order fractions and mixed numbers • Calculate fractions of amounts • Calculating percentages of amounts • Multiplying fractions, including simplifying (cancelling common factors) • Multiplying fractions and mixed numbers • Dividing fractions and mixed numbers • Adding and subtracting fractions with the same denominator • Adding and subtracting fractions with different denominators • Adding and subtracting mixed numbers • Solve worded fraction problems • Write percentages as fractions and decimals • Converting between fractions, decimals and percentages • Compare using $<$ or $>$ and order fractions, decimals and percentages
Introduces: <ul style="list-style-type: none"> • Construct and interpret pie charts • Calculate the mean, mode and median of data in a frequency table • Understand the advantages and disadvantages of different averages • Calculate the range and interquartile range • Identify outliers and explain their effect on averages/ranges • Compare distributions using averages and range • Construct frequency tables for grouped data • Construct and interpret Histograms with equal widths • Construct and interpret Histograms with unequal class widths • Calculate frequency density 	Introduces: <ul style="list-style-type: none"> • Convert recurring decimals to fractions • Solving complex worded problems with a mixture of fractions, decimals and percentages

Spring 2

Chapter 6: Formulae & Functions

Assessment: Chapter Test A

Builds Upon:

- Write formulae from sentences
- Substitute to solve (positive and negative numbers)
- Use standard formulae (e.g. kinematics)
- Simplify expressions
- Expand single brackets
- Simplify algebraic fractions

Introduces:

- Change the subject of formulae
- Construction mapping diagrams for functions
- Write the inverse of a function $f(x) \rightarrow f^{-1}(x)$
- Write and solve composite functions
- Identify expressions, equations, inequalities, formulae and identities
- Prove identities and find missing values
Prove statements to be true or false
- Expand double brackets
- Factorise quadratic expressions
- Distinguishing between, and factorise : $x^2 - 4$ and $x^2 - 4x$
- Complete the difference of two squares

Summer 1

Chapter 7: Working in 2D

Assessment: Chapter Test A

Builds Upon:

- Accurately measure and draw line segments and angles
- Bearings on a map
- Area of quadrilaterals (squares/rectangles/parallelograms/trapeziums) and triangles
- Area of compound 2D shapes

Introduces:

- Apply scale to drawings -find distances on a map and in real life
- Sketching lines such as $y = -2$, $y = x$ etc.
- Completing transformations:
 - Translations
 - Reflections
 - Rotations from origin and a point
 - Enlargements (scale factor greater than 1, between 0 and 1, & negative)
 - Enlargements from a point
 - Combinations of Transformations
- Describing transformations

Summer 2

Chapter 8: Probability	Chapter 9: Estimation and Approximation
Assessment: Chapter Test A	Assessment: Chapter Test A
Builds Upon: <ul style="list-style-type: none">• Understand the probability scale• Construct sample space diagrams List sample space of an experiment• Write experimental and theoretical probabilities as fractions	Builds Upon: <ul style="list-style-type: none">• Round to appropriate degree of accuracy (10,100,1000s, dps, sfs)• Use approximation to make estimates• Check calculations using approximation and estimation• Use common calculator functions• Convert units of length, mass, volume, capacity, time and area• Calculate the upper and lower bounds of rounded values
Introduces: <ul style="list-style-type: none">• Write experimental and theoretical probabilities as relative frequencies• Calculate expected frequencies• Compare theoretical probabilities with experimental probabilities• Recognise mutually exclusive events and exhaustive events• Understand that the probabilities of mutually exclusive exhaustive events sum to one• Compare bias and equally likely events	Introduces: <ul style="list-style-type: none">• Estimate square roots• Calculate compound units of speed and density• Rearrange compound unit calculations to find missing values• Use inequality notation to state error intervals and interpret limits of accuracy

Year 10

Autumn 1

Chapter 10: Equations and Inequalities

Assessment: Chapter Test A

Builds Upon:

- Solving two step equations (brackets, negatives)
- Solving equations involving fractions (and implied brackets)
- Solving equations with the unknown on both sides
- Forming and solving equations
- Solving by completing the square
- Solving by applying the quadratic formula
- Forming and solving quadratic equations
- Solving simultaneous equations graphically
- Solving simultaneous equations using elimination

- Solving equations using trial and improvement
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Introduces:

- Solving quadratics graphically for the roots (x intercepts)
- Solving quadratics with/without coeff of x^2 by factorising
- Solving simultaneous equations using substitution
- Solving simultaneous equations between a linear and quadratic
- Forming and solving simultaneous equations
- Using iteration formulae to find a solution to a given number of decimal places

Autumn 2

Chapter 11: Circles and Constructions

Assessment: Chapter Test A

Builds Upon:

- Circumference of circles
- Area of circles
- Circumference and area of composite shapes involving parts of circles
- Construct angle
- Construct line bisectors (of a line, from a point to a line, from a point on a line)
- Construct triangles
- Construct quadrilaterals,
- Construct an angle of 60 degrees
- Construct loci from points, lines, around shapes etc.
- Construct loci involving a change of radius or rolling shapes etc.

Introduces:

- Arc length
- Area of sectors
- Perimeter and area of composite shapes involving sectors
- Circle Theorems
- Proof of circle theorems

Chapter 12: Ratio and proportion

Assessment: Chapter Test A

Builds Upon:

- Express proportions of an amounts as fractions or percentages
- Calculate percentage increases and decreases using multiplication
- Find the original value follow a percentage increases and decreases
- Simplify ratios
- Write ratios from worded questions

Introduces:

- Share amounts into a ratio (ADAM)
- Use scale factors, scale diagrams and maps.
- Understand and calculate simple interest

Spring 1

Chapter 13: Factors, powers and roots

Assessment: Chapter Test A

Builds Upon:

- Know and use the language of prime numbers, factors and multiples
- Write a number as the product of its prime factors (prime decomposition)
- Construct a prime factor venn
- Identify HCF
- Identify LCM
- Find square and cube roots of numbers and apply law of indices
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Introduces:

- Estimate the square or cube root of an integer
- Simplify expressions involving surds
- Rationalise fractions involving surds

Chapter 14: Graphs 1

Assessment: Chapter Test A

Builds Upon:

- Equation of a straight line $y=mx+c$
- Calculating gradient
- Identifying y intercept
- Graphing linear equations
- Writing the equation for linear graphs
- Properties of parallel and perpendicular lines
- Writing the equations for parallel and perpendicular lines
- Equation of quadratic curves $ax^2+bx+c=y$
- Graph quadratic equations
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Introduces:

- Identifying x intercepts (roots) and y intercepts graphically and algebraically
- Identifying turning points graphically and algebraically
- Properties of quadratic functions
- Kinematic graphs (solving distance, speed and acceleration problems)
- Solving Inequalities
- Graphing Inequalities

Spring 2

Chapter 15: Working in 3D

Assessment: Chapter Test A

Builds Upon:

- Draw and interpret net diagrams
- Calculate surface area of 3D shapes

- Draw and interpret plans and elevation of 3D shapes

- Calculate volume of a right prism
- Calculate volume of a cylinder

Introduces:

- Apply compound units to calculate mass ($m=vd$)
- Calculate the volume of frustums, spheres, hemispheres pyramids and cones
- Apply reasoning and problem solving

Summer 1

PPES	Chapter 16: Handling Data 2	Chapter 17: Calculations 2
Assessment 2x 90 minute PPEs	Assessment: Chapter Test A	Assessment: Chapter Test A
	<p>Builds Upon:</p> <ul style="list-style-type: none"> • Calculate estimated mean, modal class and class interval of the median for grouped data • Construct scatter graphs and describe correlation • Make predictions based on the correlation (interpolation vs. extrapolation) • Construct time series graphs • Discuss any short term trends, seasonal variation and longer term trends • Construct histograms • Solve frequency density problems using histograms 	<p>Builds Upon:</p> <ul style="list-style-type: none"> • Convert in and out of index form • Solve calculations involving index laws (including roots, negatives, fractional indices) • Convert in and out of standard form • Solve calculations in standard form
	<p>Introduces:</p> <ul style="list-style-type: none"> • Construct and interpret box plots • Construct and interpret cumulative frequency graphs <p>Compare spread using box plots</p>	<p>Introduces:</p> <ul style="list-style-type: none"> • Simplify and manipulate surds • Solve calculations involving fractions, surds and pi • Construction mapping diagrams for functions • Write the inverse of a function $f(x) \rightarrow f^{-1}(x)$ • Write and solve composite functions

Summer 2

Chapter 18: Graphs 2

Assessment: Chapter Test A

Builds Upon:

- Graphing linear and quadratics equations
- Sketching translations (including reflections, transformations etc.)

Introduces:

- Recognise and plot graphs of cubic functions
- Recognise and plot graphs of reciprocal functions
- Recognise and sketch graphs of exponential functions
- Recognise and sketch trigonometric functions
- To recognise and sketch translation and reflections of graphs
- Draw and interpret non-standard graphs of real-life situations
- Gradients and areas under graphs
- Equation of a circle
- Find the tangent to a circle at a point

Year 11

Autumn 1

Chapter 19: Pythagoras, Trigonometry and Vectors

Assessment: Chapter A Test

Builds Upon:

- Apply Pythagoras' theorem to find long sides
- Apply Pythagoras' theorem to find short sides

Introduces:

- Apply Pythagoras' theorem to find distance between two points
- Apply trigonometric ratios (sin/cos/tan) to find missing sides in right angle triangles
- Apply trigonometric ratios (sin/cos/tan) to find missing angles in right angle triangles
- Know the exact values of $\sin\theta$ and $\cos\theta$ for $\theta = 0, 30, 45, 60, 90$ degrees
- Know the exact value of $\tan\theta$ for $\theta = 0, 30, 45, 60$ degrees
- Apply the sine rule to find missing lengths and angles
- Apply the cosine rule to find missing lengths and sides
- Apply sine formula for the area of non right angle triangles
- Solve 3D Pythagoras' theorem and trigonometry problems
- Write column vectors and draw vector diagrams
- Add and subtract vectors
- Calculate multiples of vectors using a scalar
- Use vectors in geometric proofs

Autumn 2

PPES	Chapter 20 Combined Events	Chapter 21: Sequences
Assessment 2x 90 minute PPES	Assessment: Chapter A Test	Assessment Chapter A Test
	<p>Builds Upon:</p> <ul style="list-style-type: none"> • Arrange sets into Venn diagrams • Describe sets using Venn diagrams (intersection, union and complement) • Construct possibility (sample) space diagrams Calculate probabilities from sample space diagrams • Use tree diagrams to show the frequency or probabilities of two events • Use tree diagrams to calculate the probabilities of independent and dependent events 	<p>Builds Upon:</p> <ul style="list-style-type: none"> • Write sequence using term to term rule • Write sequences using position to term rule (nth rule) • Write the position to term rule (nth rule) for a linear sequence • Recognise special types of sequence (square, cube, triangular, arithmetic, geometric, Fibonacci and quadratic) • Find terms of quadratic sequence using term to term or position to term rule • Write the position to term rule (nth rule) for a quadratic sequence
	<p>Introduces:</p> <ul style="list-style-type: none"> • Use Venn diagrams to record outcomes and calculate probabilities of events • Calculate estimated outcomes using probabilities 	<p>Introduces:</p> <ul style="list-style-type: none"> • Applications to problem solving

Spring 1

Chapter 22: Units and Proportionality

Assessment: Chapter A Test

Builds Upon:

- Calculations using standard and compound units (speed, density and pressure)
- Compare lengths, areas, and volumes of similar shapes
- Solve direct proportion problems
- Interpret the gradient of a straight line graph as a rate of change
- Solve inverse proportion problems

Introduces:

- Interpret graphs that illustrate direct and inverse proportion
- Set up, solve and interpret growth and decay problems

Spring 2

PPES	23: Algebraic Proofs	GCSE EXAM REVISION
Assessment 2x 90minute PPES	Assessment NA	Assessment NA
	Builds Upon <ul style="list-style-type: none">• Algebraic identities• Constructing mathematical arguments	Builds Upon: Content informed by QLAs and teacher led
	Introduces <ul style="list-style-type: none">• Counter examples• LHS/RHS proofs• Odd/Even proofs	Introduces:

Summer 1

GCSE EXAM REVISION

Assessment:

3 x 90 minute formal public exams

Builds Upon:

Content informed by QLAs and teacher led

Introduces:

Summer 2